Marbled Murrelet Effectiveness Monitoring
Population Team Meeting November 22, 1999

In Attendance:

Naomi Bentivoglio	Marty Raphael
Tim Max	Chris Thompson

Via Conference Call:

Jim Baldwin (~1 hr)	C.J. Ralph
Sherri Miller	Craig Strong

Overview

In advance of the meeting, researchers provided draft sampling designs. The group discussed and compared these for similarities and differences (see summary table below). Certain aspects of the designs still need further development (e.g., common understanding about what constitutes a sampling unit, how best to achieve independent sampling of the offshore strata, number of alongshore subpopulations to sample, etc.). Also the target population may still require some discussion.

We're working with three strata - alongshore, offshore, and time. There are two statistical reasons to further stratify within each strata: 1) variance reduction and 2) to make a separate inference (in each strata). Marty and Chris have data that show increased variance in the offshore area. NOTE: once we set offshore strata, we're going to have to deal with them for the entire duration of the monitoring program. It gets very complicated if you try to change the size or amount of effort per strata over time. We'll have enough unforseen complications so we should strive for simplicity.

We need to strive for circulating (for peer review) an agreed upon sampling design by the end of February, 2000. The goal is to begin a new sampling design in the 2000 field season.

Sampling units:

If you do 60 8km segments, each segment is a sample unit as long as they are independently located or chosen and n=60. If you do 10 areas of 80km in length within which are clusters of segments that are not independently chosen, then n=10. Replicates are autocorrelated if they happen within a temporal frame close together.

Definitions:

1. Target population - biological population about which valid statistical inferences can be made based on the sampling design.
2. Sample frame - exhaustive/complete list of all possible sample units from which samples can be made, eg. time window, replicate placement, replicate orientation, replicate length.
3. Sampling unit (replicate) -
    a) specific along-shore placement (randomly chosen) of transect within each along shore stratum (eg. North Coast, South Coast, Strait of Juan de Fuca).

b) distance from shore randomly chosen within each distance from shore stratum.
c) transect placement, transect length, transect orientation

The next meeting will be a two day session. Still to be discussed:
1. Protocol.
2. Allocation over space. Coverage of the coast.
3. End to end overlap along shore.
4. Productivity.
5. Random selection then repeating that selection or continuously random selection.
6. Definition of a replicate.

To Do List
1. All will diagram their sampling designs for clarification. What will it look like after one day? After one set of replicates? After one season? Please do this by November 29th.
2. Naomi will send the table to everyone by November 29th.

POST MEETING NOTE: Subsequent to the meeting, several researchers asked for further guidance from the two statisticians on the team. The draft sampling designs have given the statisticians an indication of what the researchers have in mind. They asked the statisticians to assist in the development of the sampling design(s) to address some of the issues of independent sampling of the strata, defining sampling units, etc. JB and TM are working on this and will provide diagrams for clarification.

Summary Table of Sampling Design Proposals

Researcher and Recovery Zone	*MR (1)	CT (1/2)	CS (3)	CJ/SM (4/5)	SB (6)
Target Population	Historic murrelet areas of N. Puget Sound and Hood Canal ~580 km of shoreline	Entire outer coast (except Columbia River, Grays Harbor and Willapa Bay), Strait of Juan de Fuca to Port Angeles ~600 km	Entire Coast ~400 km	Entire Coast ~600 km	~50-100 km of Central California
Subpopulations ("Along-shore" strata)	Two - San Juan Islands and selected portions of Puget Sound	Three - North Coast, South Coast and Strait of Juan de Fuca	Two - North and Central Coast	Four or Ten (still discussing)	One
Replicate (n)	Complete set of transects for a geographic area (4 or more)	One set of zigzag and parallel transects in each sub area (NC, SC, SJF) (5-10)		One complete set of transects in each of 4 or 10 subpopulation areas (5-10)	
Sampling Unit	One inshore and one offshore transect in a section of 6-10km of coastline	Cluster of transects sampled within 1-2 days	80 km unit composed of 7 inshore/3 offshore parallel transects	40-80 km transects	Ten 8 km segments of 7 inshore/3 offshore
Transect Placement	Randomly select ~20 starting points	Randomly choose 80 km segment within each subpopulation	Randomly choose 80 km segment in each subpopulation		
Transect Orientation	Parallel	Parallel inshore, zigzag offshore	Parallel	Parallel in first two strata, zigzag in third	Parallel or zigzag
Distance Offshore and Strata (Allocation of Effort Per Strata)	1. 0-500 m (66%) 2. 500-2000 m (33%)	1. 300-1000 m (70%) 2a. 1000-5000 m (SJF/NC) (30%) 2b. 1000-8000 m (SC) (30%)	1. Shore to 1400 m (70%) 2. 1400 to 5000 m (30%)	1. 400-1500 m (75%) 2. 1500-2500 m (20%) 3. 2500-3500 m (5%)	1. 300-1400 m (70%) 2. 1400-3000 m (30%)

Researcher and Recovery Zone	*MR (1)	CT (1/2)	CS (3)	CJ/SM (4/5)	SB (6)
Time of Year	Mid-May to mid-July	Mid-May to mid-July	20 May to 20 July	Mid-May to mid-August	1 June to late August

*Note I updated Marty's information with him after the meeting.